

# The effect of intangible assets and liabilities on operating performance of electronics industry

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**Abstract - The importance of intangible assets has always been one of the issues that accounting researchers pay attention to. Intangible liabilities can result in company's bankruptcy and the extend of influence cannot be overlooked. Electronic industry is full of high-tech companies that value intangible assets most. The study examines publicly listed companies of electronic industry in Taiwan Stock Exchange to find whether there is effect of intangible assets and liabilities on companies' operating performance. The intangible assets and liabilities are measured by hidden value method, of which if companies' market value deduct book values is positive there is intangible assets, while there will be intangible liabilities if companies' market value deduct book value is negative. Our study found that operating performance of companies with intangible assets is apparently better than the one with intangible liabilities. There is positive correlation between intangible assets and operating performance and negative correlation between intangible liabilities and operating performance. Result of this study is worthy to be paid attention to by companies' management and investors**

*Index Terms* – Intangible assets, intangible liabilities, operating performance.

## INTRODUCTION

Andriessen (2001) divided enterprise resources to resource and production resource, which is classified to tangible assets, monetary assets and intangible assets. Intangible assets consist of skills, corporate culture, technology, management, human resource, brand, and relationships, etc. The method of creating corporate value has eventually transformed from tangible assets to intangible assets. (Khalil, 2000 and Lev, 2000) The importance of intangible assets has gradually risen. From 1987 to 1998, the ratio of intangible assets on company's total assets has increased from 5% to 10%. (Ciprian, et al., 2012) The database of Ocean Tomo has shown that in S&P 500, (Standard and Poor's 500), the ratio of intangible assets on market value

has risen from 17% in 1975 to 84% in 2015. Even under the effect of Covid-19 in 2020, the ratio of intangible assets on market value of S&P 500 has reached 90%. It appears that in comparing to tangible assets, intangible assets have become more important to companies. The effect of intangible assets on companies includes the leading advantages, producing residual profit, avoiding competitors' imitation, etc., which are viewed by many companies as competitive advantages. (Lev, 2001; Bianchi, 2017; Haskel and Westlake, 2018)

Although intangible assets are very important in present, there is also intangible liabilities. (Giuliani., 2013) There are many intangible liabilities, such as bad corporate reputation, losing employees, dangerous working environment, reputation loss, environmental events, fraud cases, terrible organizational culture and more extensive political environment, etc. ((Barney, 1986; Harvey and Lusch, 1999; Caddy, 2000; Stam, 2009) Harvey and Lusch(1999) argued that these unrecorded intangible assets can lead to companies' bankruptcy. Intangible liabilities damage corporate value intangibly. (Caddy, 2000)

Regardless of practical arena or academic research, accounting of intangible assets has always been the one with biggest controversy in accounting field and is the most difficult one to evaluate. (Skinner, 2008a; Wrigley, 2008; Lev et al., 2009; Penman, 2009) Wrigley(2008) proposed that market value deduct book value at the end of the year can be the value of intangible assets. Precisely speaking, many studies have argued that if a company's market exceeds its book value, there is unrecorded intangible assets. (Lev, 2008; Lev et al., 2009) On the contrary, if a company is sold below its book value, there is recorded intangible liabilities. (Harvey and Lusch, 1999; De Santis and Giuliani, 2013; Penman, 2009) Intangible assets let companies creating value while intangible liabilities damage corporate value. (Chen et al., 2005; Skinner, 2008a; Lev et al., 2009; Stam, 2009; De Santis and Giuliani, 2013) Most studies have focused on intangible assets and basically overlook intangible liabilities. Thus, based on literature review, many studies have shown that intangible assets have positive effect on companies' operating performance (Muhammad

and Ismail,2009; David X. Qiu,2009; Li and Wang,2014; Haji and Mohd Ghazali,2018; Seo and Kim,2020 ) while the effect of intangible liabilities is very little. (DeSantis and Giuliani,2013; Giuliani,2013)

Every industry has its unique structure and competitive characteristics. (Paracha and Siddiqui, 2019) For accounting workers, accounting for intangible assets has always been a difficult to measure question. (Skinner, 2008a; Wrigley, 2008; Penman, 2009) Intangible assets are not natural in essence and cannot be touched. Intangible assets obviously affect companies' profitability, of which many studies have confirmed and approved. High-tech industry own more intangible assets and Qureshi and Siddiqui (2021) proposed that companies of high-tech industry must know the importance of intangible assets. In Taiwan high-tech industry consists mostly of electronic industry. In addition, other studies also confirm how many decisive factors of intangible assets affect performance and companies' profitability (Gowthorpe, 2009; Paracha and Siddiqui, 2019) In other words, many studies have shown that intangible assets have positive effect on companies' operating performance (Chen, et al, 2005; Lev, et al., 2009), but the study on the effect of intangible liabilities on companies' financial performance is very little. (De Santis and Giuliani, 2013; Giuliani, 2013)

Intangible liabilities are often overlooked by companies and if not noticed by companies, it may result in bankruptcy. (Harvey and Lusch, 1999) That is the main reason that intangible liabilities are seen as competitive disadvantages that may reduce corporate value. (De Santis and Giuliani, 2013) However, the effect of intangible liabilities on operating performance is overlooked. Thus, the study used data of publicly listed companies in electronic industry of Taiwan Stock Exchange (TaiEx) from 2013 to 2020 as study sample, focusing on electronic industry to explore the effect of intangible assets and liabilities on companies' operating performance, whether there are unrecorded intangible liabilities, and the correlation between intangible assets and liabilities and companies' operating performance.

#### DATA

The study mainly explored the correlation between intangible assets and liabilities and companies' operating performance and used public listed companies in electronic industry of TaiEx as study objects. The period of sample studied are from 2013 to 2020, totaling 8 years of data. Data source is the financial information of publicly listed companies in Taiwan form Taiwan Economic Journal. (TEJ) The study excluded non electronics industries for that companies of high-tech industry must know the importance of intangible assets while electronic industry in Taiwan consist most outstanding and largest high-tech companies. The study also excluded companies with incomplete financial data in the study period and samples that have no consecutive eight years of positive hidden value or negative hidden value. Based on the aforesaid standard of sample selection, the numbers final sample collected is 2,696.

#### THEORETICAL FRAMEWORK AND ECONOMETRIC METHODOLOGY

The study applied research model of Haji and Mohd Ghazali (2018) and constructed multiple regression analysis by ordinary least square (OLS). The effect of intangible assets and liabilities on companies' operating performance is explored according to the following regression model.

1. Model (1), (2), (3), and (4) mainly explored the correction between intangible assets and companies' operating performance.

$$ROA_{i,t} = \gamma_0 + \gamma_1 IA_{i,t} + \gamma_2 SIZE_{i,t} + \gamma_3 AGE_{i,t} + \gamma_4 LEV_{i,t} + \epsilon_i \quad (1)$$

$$ROE_{i,t} = \gamma_0 + \gamma_1 IA_{i,t} + \gamma_2 SIZE_{i,t} + \gamma_3 AGE_{i,t} + \gamma_4 LEV_{i,t} + \epsilon_i \quad (2)$$

$$Nicome_{i,t} = \gamma_0 + \gamma_1 IA_{i,t} + \gamma_2 SIZE_{i,t} + \gamma_3 AGE_{i,t} + \gamma_4 LEV_{i,t} + \epsilon_i \quad (3)$$

$$PMargin_{i,t} = \gamma_0 + \gamma_1 IA_{i,t} + \gamma_2 SIZE_{i,t} + \gamma_3 AGE_{i,t} + \gamma_4 LEV_{i,t} + \epsilon_i \quad (4)$$

2. Model (5), (6), (7), and (8) mainly explored the correction between intangible liabilities and companies' operating performance.

$$ROA_{i,t} = \gamma_0 + \gamma_1 IL_{i,t} + \gamma_2 SIZE_{i,t} + \gamma_3 AGE_{i,t} + \gamma_4 LEV_{i,t} + \epsilon_i \quad (1)$$

$$ROE_{i,t} = \gamma_0 + \gamma_1 IL_{i,t} + \gamma_2 SIZE_{i,t} + \gamma_3 AGE_{i,t} + \gamma_4 LEV_{i,t} + \epsilon_i \quad (2)$$

$$Nicome_{i,t} = \gamma_0 + \gamma_1 IL_{i,t} + \gamma_2 SIZE_{i,t} + \gamma_3 AGE_{i,t} + \gamma_4 LEV_{i,t} + \epsilon_i \quad (3)$$

$$PMargin_{i,t} = \gamma_0 + \gamma_1 IL_{i,t} + \gamma_2 SIZE_{i,t} + \gamma_3 AGE_{i,t} + \gamma_4 LEV_{i,t} + \epsilon_i \quad (4)$$

ROA	Return on assets °
ROE	Return on equity
NIncome	Net income
PMargin	Gross margin ratio
IA	Intangible assets(Difference of market value over book value in which market value is higher than book value)
IL	Intangible liabilities (Difference of book value over market value in which book value is higher than market value)
SIZE	Company scale
AGE	Company's years
LEV	Liability ratio

#### EMPIRICAL RESULTS AND POLICY IMPLICATIONS

I. Descriptive analysis

TABLE I  
DESCRIPTIVE ANALYSIS-INTANGIBLE ASSETS AND LIABILITIES

	Minimu m	Maximum	Average	Mediu m	Standar d Dev.
IA					
ROA(%)	-92.80	81.62	10.88	11.65	11.46
ROE (%)	-315.90	152.76	7.99	11.97	24.57
NIncome	6,876,006.00	518,158,082.00	2,390,714.48	256,805.00	2,0725,031.20
Pmargin(%)	625.74	100.00	26.66	25.75	24.95
Size	17,267.00	2,760,711.405.00	23,442.370.00	3,433.440.00	130,049.777.77
Age	5.00	57.00	24.52	23.00	9.00
Leverage (%)	5.01	84.12	38.70	36.90	17.78
IL					
ROA(%)	-13.99	22.51	5.49	5.30	5.31
ROE(%)	-43.12	56.97	2.58	3.22	8.04
NIncome	21,599,416.00	37,028,609.00	516,780.32	96,389.00	3,160,751.33
Pmargin(%)	-12.06	77.67	17.33	15.28	12.39
Size	668,927.00	508,200,885.00	27,031.525.51	5,026.760.50	80,071,693.76
Age	5.00	55.00	29.73	30.00	10.19
Leverage (%)	5.01	71.06	37.32	37.76	15.70

Note1 : Total of 2,256 intangible assets ; 440 intangible liabilities.  
 Note2 : ROA is return on assets ; ROE is return on equity ; Nincome is net income ; Pmargin is gross profit ratio ; Size is company scale ; Age is company's years ; Lev is liability ratio.

II. Pearson Correlational Analysis

Table 2. Correlational analysis-intangible assets								
	ROA	ROE	Nincome	Pmargin	IA	Size	age	Lev
ROA	1							
ROE	0.826*** 0.000	1						
Nincome	0.730*** 0.000	0.797*** 0.000	1					
Pmargin	0.50*** 0.000	0.404*** 0.000	0.344*** 0.000	1				
IA	0.136*** 0.000	0.068*** 0.001	0.073*** 0.001	0.083*** 0.000	1			
Size	0.406*** 0.000	0.412*** 0.000	0.402*** 0.000	-0.002 0.929	0.275*** 0.000	1		
age	-0.066*** 0.002	0.002 0.906	0.056*** 0.008	-0.097*** 0.000	0.038* 0.072	0.141*** 0.000	1	
Lev	-0.303*** 0.000	-0.218*** 0.000	-0.143*** 0.000	-0.591*** 0.000	-0.034 0.107	0.174*** 0.000	0.139*** 0.000	1

\*\*\* 0.01 Level of significance  
 \*\* 0.05 Level of significance  
 \* 0.1 Level of significance

Table 3. Correlational analysis-intangible liabilities								
	ROA	ROE	Nincome	Pmargin	IL	Size	age	Lev
ROA	1							
ROE	0.623*** 0.000	1						
NIncome	0.627*** 0.000	0.75*** 0.000	1					
Pmargin	0.003 0.953	0.221*** 0.000	0.097** 0.043	1				
IL	-0.271*** 0.000	-0.015 0.759	-0.106** 0.026	0.122** 0.011	1			
Size	0.413*** 0.000	0.178*** 0.000	0.289*** 0.000	-0.198*** 0.000	-0.684*** 0.000	1		
age	-0.156*** 0.001	-0.001*** 0.982	-0.093* 0.050	0.082* 0.064	0.251*** 0.000	-0.193*** 0.000	1	
Lev	0.147*** 0.002	0.029 0.548	0.11** 0.022	-0.29*** 0.000	-0.13*** 0.006	0.353*** 0.000	0.155*** 0.001	1

\*\*\* 0.01 Level of significance  
 \*\* 0.05 Level of significance  
 \* 0.1 Level of significance

III. Empirical result analysis

Table 4 showed that based on the empirical result, intangible assets (IA) has positive correlation to return on assets (ROA), return on equity (ROE), net income (NIncome) and gross profit ratio. (Pmargin), with correlation coefficient of 2.005, 2.281, 0.399, and 4.180, all achieving 1% level of significance. Thus, intangible assets has positive effect on companies' operating performance, which is consistent with the findings of previous studies. (Chen et al,2005; Clarke et al,2011; Haji and Mohd Ghazali,2018)

Table 4 Performance and intangible assets(IA)-Using intangible assets of current period								
	IA and ROA (model 1)		IA and ROE (model 2)		IA and Nincome (model 3)		IA and Pmargin (model 4)	
Variables	Coeffi cient	Sig	Coeffi cient	Sig	Coeffi cient	Sig	Coeffi cient	Sig
IA	2.005	0.000* **	2.281	0.000* **	0.399	0.006* **	4.180	0.000* **
Size	2.897	0.000* **	7.259	0.000* **	6.511	0.000* **	-7.027	0.000* **
Age	-0.061	0.002* **	-0.005	0.882	0.020	0.275	-0.011	0.749
LEV	-0.180	0.000* **	-0.255	0.000* **	-0.116	0.000* **	-0.416	0.000* **
R <sup>2</sup>	0.588		0.509		0.547		0.573	
AdjustedR <sub>2</sub>	0.346		0.260		0.299		0.328	
F-statistic	297.470		197.280		239.915		274.744	
Prob.(F-statistic)	0.000		0.000		0.000		0.000	

Note 1 : \*\*\*, 0.01 Level of significance, \*\*, 0.05 Level of significance, \*, 0.1 Level of significance

Note 2 : ROA is return on assets ; ROE is return on equity ; Nincome is net income ; Pmargin is gross profit ratio ; Size is company scale ; Age is company's years ; Lev is liability ratio.

The controlling variable of company's scale (SIZE) also has positive correlation with ROA, ROE and NIncome, with correlation coefficient of 2.897, 7.259, 6.511, also achieving 1% level of significance, representing that ROA, ROE and

NIncome will increase with company's scale. The correlation between company's scale and Pmargin is negative, with correlation coefficient of -7.027, achieving 1% level of significance, meaning that gross profit ratio will decrease as company's scale grows larger. Company's years (Age) and ROA showed negative correlation, with correlation coefficient of -0.016, positive correlation with NIncome, and negative correlation with ROE and Pmargin, not achieving level of significance. Moreover, liability ratio (LEV) is negatively correlated to ROA, ROE, NIncome, and Pmargin, with correlation coefficient of -0.180, -0.255, -0.116, and -0.416, all achieving 1% level of significance, meaning that ROA, ROE, NIncome, and Pmargin will reduce with the growth of liability ratio.

Table 5 showed that based on empirical results, intangible liabilities (IL) has negative correlation to ROA, ROE, NIncome and Pmargin, with correlation coefficient of -1.815, -3.243, -2.896, and -3.053, all achieving level of significance. Thus, intangible liabilities have negative effect on companies' operating performance, which is consist with previous studies. (Haji and Mohd Ghazali,2018)

The controlling variable of company's scale (SIZE) also has positive correlation with ROA, ROE NIncome, and Pmargin, with correlation coefficient of 8.243、11.171、12.317、6.296, all achieving level of significance, representing that ROA, ROE, NIncome and Pmargin will increase with company's scale.

Variables	ILandROA (model5)		ILandROE (model6)		ILandNIncome (model7)		ILandPmargin (model8)	
	Coefficient	Sig	Coefficient	Sig	Coefficient	Sig	Coefficient	Sig
IL	-1.815	0.000**	-3.243	0.000***	-2.896	0.000**	-3.053	0.000**
Size	8.243	0.000**	11.171	0.000***	12.317	0.000**	6.296	0.005**
Age	-0.043	0.061*	0.037	0.305	-0.042	0.369	0.136	0.017*
LEV	-0.030	0.074*	-0.093	0.000***	-0.048	0.169	-0.285	0.000**
R2	0.487		0.353		0.357		0.371	
Adjusted R2	0.237		0.125		0.127		0.137	
F-statistic	33.868		15.520		15.859		17.329	
Prob.(F-statistic)	0.000		0.000		0.000		0.000	

Note1: \*\*\*0.01Levelofsignificance,\*\*0.05Levelofsignificance,\*0.1Levelofsignificance

Note2: ROAisreturnonassets; ROEisreturnonequity; Nincomeisnetincome;

Pmarginisgrossprofitratio; Sizeiscompany'sscale; Ageiscompany's years; Levisliabilityratio.

The correlation between company's years (Age) and ROA is negative, with correlation coefficient of -0.043, achieving 1% level of significance, meaning that ROA will decrease as companies become older. Company's years (Age) is positively correlated to ROE, not achieving level of significance, and Pmargin, with correlation coefficient of 0.136, achieving level of significance. Liability ratio (Lev) has negative correlation to ROA, ROE and Pmargin, with correlation coefficient of -0.030, -0.093, and -0.285, all

achieving level of significance. This means that ROA, ROE and Pmargin will decrease as liability ratio increases. Moreover, liability ratio (Lev) is negatively correlated to NIncome, not achieving level of significance.

## CONCLUSION

Companies must know the importance of intangible assets and liabilities, especially high-tech industry. Previous studies mostly pay attention to intangible assets, not considering intangible liabilities. (Gowthorpe, 2009; Stam, 2009) The existence of intangible liabilities and their effect on financial performance remain questionable. (Caddy,2000; Stam,2009) The study found that intangible assets and liabilities are hidden value. Companies that own intangible assets (with positive hidden value) have operating performance that are apparently better than those with intangible liabilities. (with negative hidden value) Intangible assets have significantly positive correlation with operating performance, while intangible liabilities have significantly negative correlation with operating performance, meaning that they both have effect on financial performance. However, because intangible assets and liabilities may need companies to disclose at their own will, general investors would not know companies' information related to such matters. Companies may have to put more emphasis on the importance of intangible assets and liabilities and their effect on operating performance.

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